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Postembryonic Development of a Neotenic Pseudoscorpion, *Microbisium pygmaeum* (ELLINGSEN, 1907)

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坂寄　廣[1)]: 幼形成熟のみられるチビコケカニムシ (*Microbisium pygmaeum*) の後胚子発生について

Abstract: External morphology of postembryonic stages of *Microbisium pygmaeum* are described with emphasis on the chaetotaxy. The change of numbers of chelal trichobothria through postembryonic development suggests that *M. pygmaeum* is a neotenic species lacking the stage with 12 chelal trichobothria, the most important characteristic of adults in most other pseudoscopion species.

Introduction

Most pseudoscorpion species are known to have the three nymphal stages; protonymph, deutonymph and tritonymph (VACHON, 1934; GABBUTT & VACHON, 1963, '65, '67, '68; GABBUTT, 1969). Some species in the genus *Microbisium* of Neobisiidae, however, have been reported to possess only the first two nymphal stages (NELSON, 1982). The author previously noted the life history of *M. pygmaeum* (KOBARI, 1983) and reported that this species also has only two nymphal stages (KOBARI, 1984). Nymphs of the Japanese neobisiid pseudoscopions are difficult and sometimes impossible to be identified because of insufficient accumulation of information on their postembryonic development.

In this paper, therefore, the author gives descriptions on external morphology of both the nymphs and the adult female of *M. pygmaeum* with stress on the chaetotaxy, using a large number of specimens collected during the course of the previous studies.

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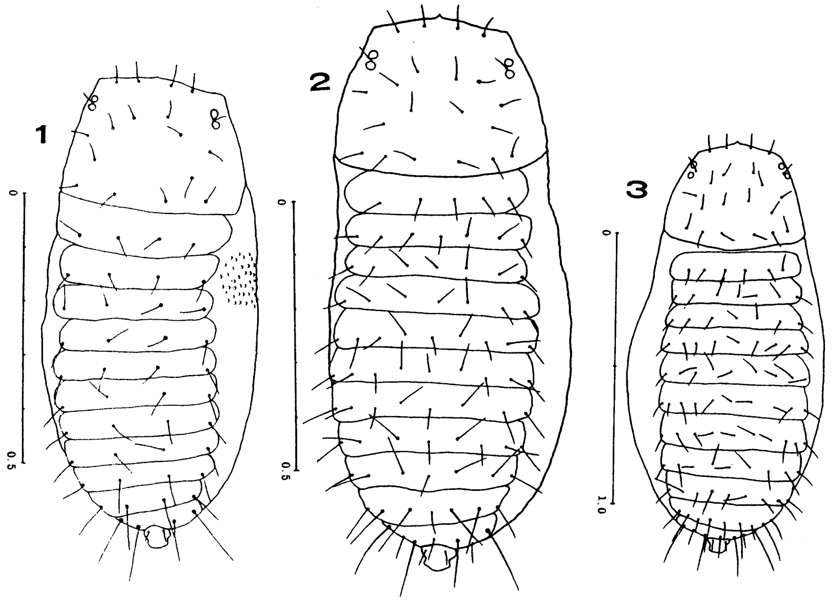
Materials and methods

Specimens of *Microbisium pygmaeum* (Ellingsen, 1907) were collected in a deciduous forest at Maegawara, Shimozuma, Ibaraki Pref., Central Japan, during May, 1978, to June, 1979, being extracted through Tullgren funnels. Microscopic preparations were produced by the method of Gabbutt and Vachon (1963). The measurements were performed according to the notes of Chamberlin (1931), being given in millimeters. These preparations will be deposited in the author's collection.

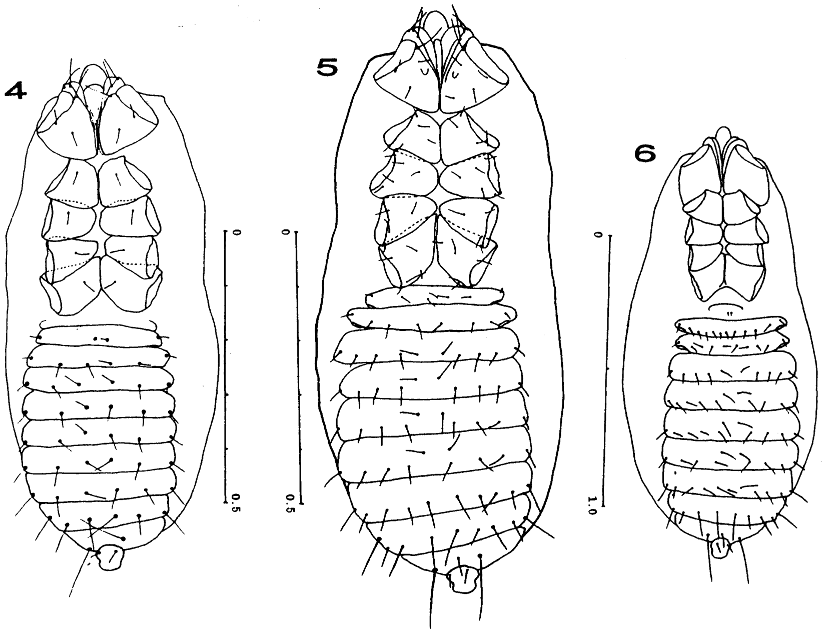
Description

Adult female: Body length 1.17–1.47 mm. Carapace (Fig. 3) a little longer than broad; derm smooth; epistomal process present; chaetotaxy 4-4-8-6, 22; with 2 pairs of eyes.

Abdomen (Fig. 3) oval, 0.82–1.08 mm long; wider than carapace. Pleural membrane granulated. Tergites (Tgs.) entirely smooth, all with setae in a single row; 5–6 setae on Tg. I, 6–8 on Tg. II, 7–12 on each of Tgs. III to X, 7–8 on Tg. XI and 2 on Tg. XII. Each sternite (St.) (Fig. 6) also generally with a row of setae, but Sts. VI–VIII each with two additional setae near median line, the setae being distinctly set out anteriorly from the row. First visible sternite equivalent to St. II with 2, occasionally



Figs. 1–3 *Microbisium pygmaeum*. Dorsal view without appendages: 1, protonymph; 2, deutonymph; 3, female.



Figs. 4–6 *Microbisium pygmaeum.* Ventral view without appendages: 4, protonymph; 5, deutonymph; 6, female.

3, microsetae; 12–15 setae on St. III, 10–14 on each of Sts. IV to X, 3–4 on St. XI and 2 on St. XII.

Coxal area as in Fig. 9; 3 long setae deposited on manducatory process of maxilla, a long seta near median line on ante-apical portion of ventral maxillary disc, and 3–5 and 4–7 short setae on maxillary disc and on each coxa, respectively. Genital complex simple, opening at posterior margin of St. II.

Chelicera (Fig. 18) 0.17–0.20 mm long and 0.13–0.15 mm wide; movable finger 0.14–0.16 long, with 10–16 acute teeth, galea absent and represented by a tiny sclerotic hump on apex of movable finger, galeal seta situated at about 1/3 from the apex; fixed finger with 11–16 teeth, palm with 5 setae; flagellum (Fig. 21) with about 7 blades, at least the first five being serrated.

Pedipalp as in Fig. 15. Surface of each palpal podomere smooth, without granulation. Palpal proportion (length-breadth ratio) as follows: Trochanter, 1.46–1.64; femur, 2.53–2.91; tibia, 1.64–1.94; and chela, 2.35–2.68. Chaetotaxy on palp as in Fig. 12; fixed and movable finger with 28–33 and 32–37 teeth, respectively, these teeth densely covering the internal margins of both fingers.

Legs I and IV as in Figs. 24 and 27, respectively.

Adult male: A detailed redescription of the adult male was given by Kobari (1984).

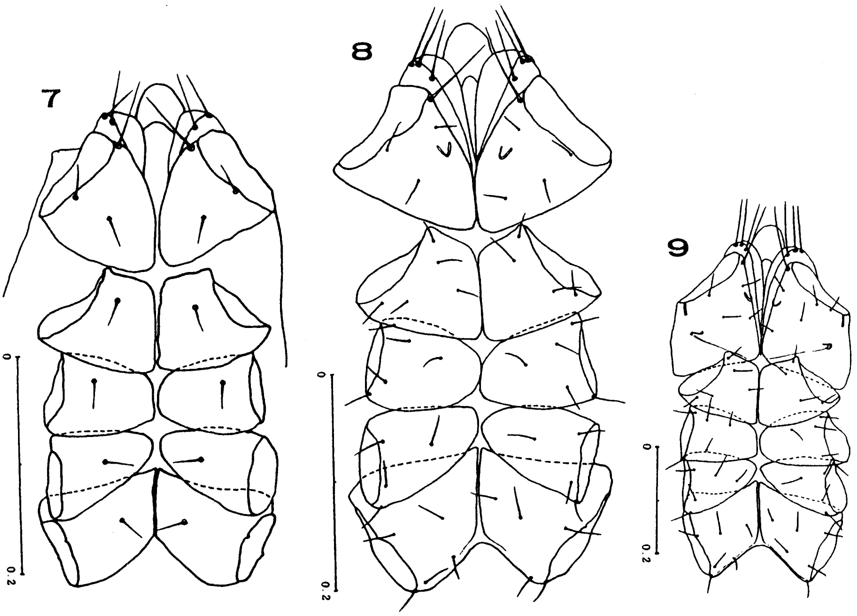
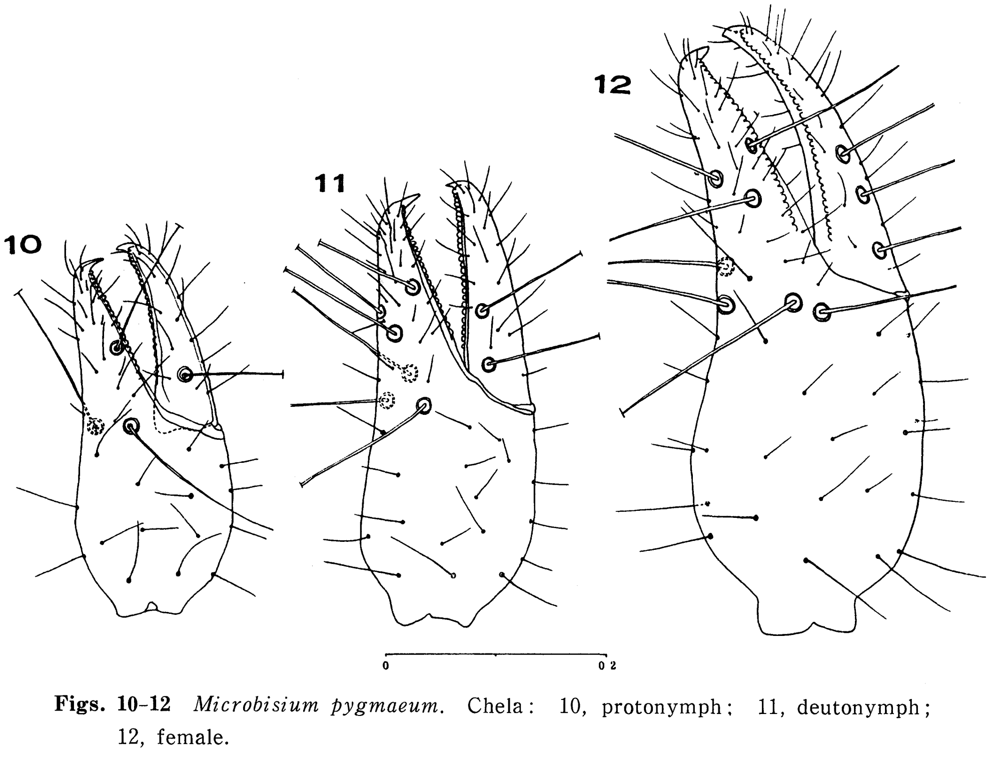
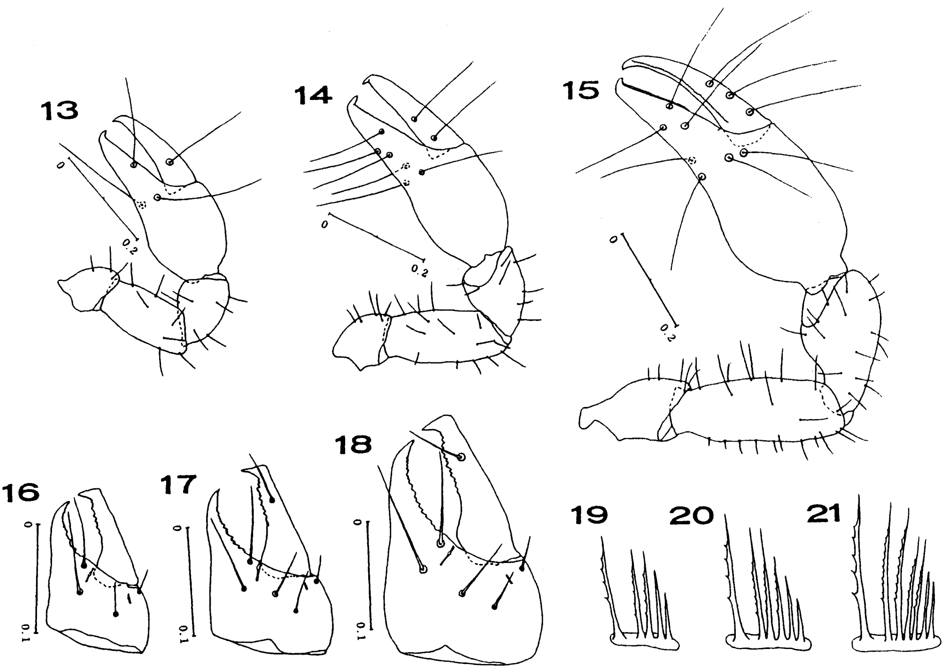


Fig. 7–9 *Microbisium pygmaeum*. Coxal area: 7, protonymph; 8, deutonymph; 9, female.



Figs. 10–12 *Microbisium pygmaeum*. Chela: 10, protonymph; 11, deutonymph; 12, female.



Figs. 13-21 *Microbisium pygmaeum*. Pedipalp (setae omitted): 13, protonymph; 14, deutonymph; 15, female. Chelicera (serrulae omitted): 16, protonymph; 17, deutonymph; 18, female. Flagellum of the chelicera (stylized): 19, protonymph; 20, deutonymph; 21, female.

Deutonymph: Body length 0.91-1.11 mm. Carapacal chaetotaxy 4-4-8-6,22 (Fig. 2). Abdomen 0.61-0.78 mm long; 5-6 setae on Tg. I, 6-10 on each of Tgs. II to X, 7 on Tg. XI and 2 on Tg. XII. No setae on St. II, 6-8 setae on St. III, 8-10 on each of Sts. IV to X, 3 on St. XI and 2 on St. XII (Fig. 5).

Coxal area as in Fig. 8; 3 long setae deposited on manducatory process of maxilla, a long seta near median line on ante-apical portion of ventral maxillary disc, 3-4 short setae on maxillary disc and 3-6 short setae on each coxa. Genital complex undeveloped.

Chelicera (Fig. 17) 0.13-0.14 mm long and 0.11-0.12 mm wide; movable finger 0.10-0.12 mm long, with 8-12 acute teeth; fixed finger with 10-14 teeth, palm with 5 setae; flagellum (Fig. 20) with 6 brades, at least the first four being serrated.

Pedipalp as in Fig. 14; two trichobothria present on movable chelal finger and 6 on fixed finger. Palpal proportion as follows: trochanter, 1.35-1.55; femur, 2.19-2.50; tibia, 1.50-1.70; and chela, 2.22-2.49. Palpal chaetotaxy as in Fig. 11; fixed and movable finger with 24-28 and 29-32 teeth, respectively.

Legs I and IV as in Figs. 23 and 26, respectively.

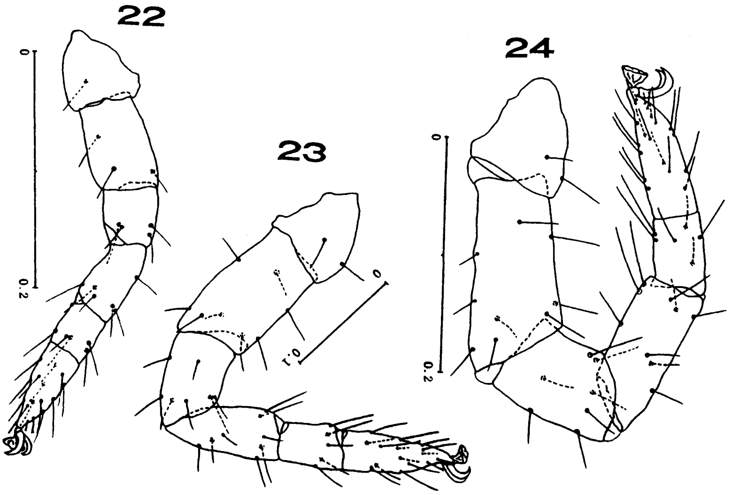


Fig. 22-24 *Microbisium pygmaeum*. Leg I : 22, protonymph; 23, deutonymph; 24, female.

Protonymph: Body length 0.79-0.85 mm. Carapacal chaetotaxy 4-4-6-4, 18 (Fig. 1). Abdomen 0.53-0.58 mm long; 4 setae on Tgs. I to XI and 2 on Tg. XII. XII. No setae on St. II, 4 setae on St. III, 6 on Sts. IV to X, 2 on each of Sts. XI and XII (Fig. 4).

Coxal area as in Fig. 7; 2 long setae deposited on manducatory process of amxilla, a long seta near median line on ante-apical portion of ventral maxillary disc, 2 short setae on maxillary disc and a short seta on each coxa.

Chelicera (Fig. 16) 0.11-0.12 mm long and 0.08-0.09 mm wide; movable finger 0.09-0.10 mm long, with 6-11 acute teeth; galeal seta absent; fixed finger with 9-13 teeth; palm with 4 setae; flagellum (Fig. 19) with 5 blades, at least the first three being serrated.

Pedipalp as in Fig. 13; a trichobothrium present on movable chelal finger and 3 on fixed finger. Palpal proportion as follows: trochanter, 1.30-1.47; femur, 2.00-2.44; tibia 1.33-1.65; and chela, 2.26-2.52. Palpal chaetotaxy as in Fig. 10; fixed and movable finger with 17-21 and 23-27 teeth, respectively.

Legs I and IV as in Figs. 22 and 25, respectively.

Concluding Remarks

Adults of many pseudoscorpion genera have 12 chelal trichobothria, 8 on fixed and 4 on movable fingers (Chamberlin, 1930; Vachon, 1934; Gabbutt & Vachon, 1963, '65, '67, '68; Gabbutt, 1969; Morikawa, 1962; Nelson, 1982). Adult females and males in some species of the genus *Microbisium*, however, are known to have only 10

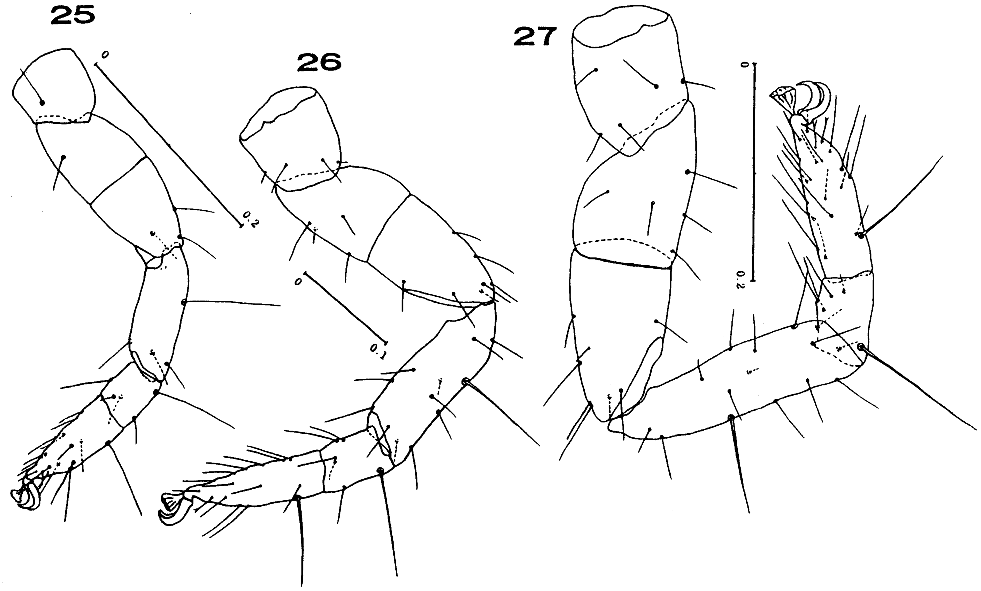


Fig. 25-27 *Microbisium pygmaeum.* Leg. Ⅳ: 25, protonymph; 26, deutonymph, 27, female.

chelal trichobothria as in tritonymphs of other pseudoscorpion genera (Chamberlin, 1930; Hoff, 1946, '49; Lawson, 1969; Nelson, 1973, '82). Weygoldt (1969), therefore, stated that adults of the *Microbisium* should be neotenic tritonymphs.

Kobari (1984) described adult *M. pygmaeum* based on one female attaching eggs on abdomen and 5 males with distinct male genitalia, both having 10 chelal trichobothria, 7 on fixed and 3 on movable finger as in the adult of *M. confusum* described by Nelson (1982). Individuals with 12 chelal trichobothria have never been found in *M. pygmaeum* in spite of intensive examination of a large number of specimens collected in various seasons (Kobari, 1983).

The present study on the postembryonic development, on the other hand, revealed that the numbers of trichobothria of the protonymphs and deutonymphs of the present species are precisely identical with those of the corresponding stages of most other pseudoscorpion species (Figs. 10 and 11). Based on these facts and considerations, it is concluded that sexually mature females and males of *M. pygmaeum* correspond to the tritonymphs of other genera and therefore *M. pygmaeum* is a neotenic species as in some other species of this genus.

摘　　要

チビコケカニムシの，成体雄を除く後胚子発生の各段階の外部形態を，特に毛序式に注目して記載した。後胚子発生過程に見られる chelal trichobothria の数の変化から，チビコケカニムシは，他の種では成体

の重要な特徴となる12本の chelal trichobothria を持ったステージが欠落した，幼形成熟による種であると結論した。

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